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EXAMINER

DHINGRA, RAKESH KUMAR

ART UNIT PAPER NUMBER

1763

DATE MAILED: 08/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/797,286

Applicant(s)

MURUGESH ET AL.

Examiner

Rakesh K. Dhingra

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 May 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 May 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION***Response to Arguments***

Applicant's arguments filed 5/24/06 have been fully considered but they are not persuasive as explained hereunder.

Rejection of Claims 1-6 and 8 under 35 USC 103 (a)

Applicant argues that Murugesh et al, Tzu et al or Halsey et al teach second vanes on the second surface of baffle and their combination does not provide suggestion or motivation to combine.

Examiner responds that one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). In this case Murugesh et al teach two gas sources 200, 65 and a baffle 248 with ridges (first vanes) 245 for the cleaning gas coming out through gas outlets 247 (Figures 1, 2A, 2B, 3 – Murugesh et al). Halsey et al teach a baffle (body) 202 with vanes 210, 212 and a gas inlet nozzle 302 (Figures 2, 3A-C, 4B). It would be obvious to provide vanes (second vanes) on the second surface of baffle in the apparatus of Murugesh et al to obtain uniformity of flow for the process gases coming out of gas outlet 85. Since the combination of Murugesh et al with Halsey et al teaches all limitations of claim 1; reference by Tzu et al is dropped and the rejection under 35 USC 103 (a) is maintained as also explained below.

Rejection of Claim 7 under 35 USC 103 (a) :

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Applicant argues that Wheat et al fails to make up deficiencies of Murugesh et al, Tzu et al and Halsey et al regarding claim 1 limitation "a baffle having first vanes on first surface and second vanes on the opposing second surface".

Examiner responds that as explained above claim 1 stands rejected, and reference by Wheat et al is used for rejection of additional limitations recited in claim 7. Thus rejection of claim 7 under 35 USC 103 (a) is maintained.

Rejection of Claims 9 and 15-19 under 35 USC 103 (a) :

Applicant argues that Frijlink fails to make up deficiencies of Murugesh et al, Tzu et al and Halsey et al regarding claim 1 limitation "a baffle having first vanes on first surface and second vanes on the opposing second surface".

Examiner responds that as explained above claim 1 stands rejected, and reference by Frijlink is used for rejection of additional limitations recited in claim 9. Similarly, references by Murugesh et al, Halsey et al and Frijlink read on limitations of independent claim 15 as explained below. Thus rejection of claims 9 and 15-19 under 35 USC 103 (a) is maintained.

Rejection of Claim 10 under 35 USC 103 (a) :

Applicant argues that Horie et al fails to make up deficiencies of Murugesh et al, Tzu et al and Halsey et al regarding claim 1 limitation "a baffle having first vanes on first surface and second vanes on the opposing second surface".

Examiner responds that as explained above claim 1 stands rejected, and reference by Horie et al is used for rejection of additional limitations recited in claim 10. Thus rejection of claim 10 under 35 USC 103 (a) is maintained.

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Rejection of Claims 11-14 under 35 USC 103 (a) :

Applicant argues that Murugesh et al, Tzu et al and Halsey et al fail to make up the deficiency of Redeker et al regarding claim 11 limitation interalia, "second vanes on second surface of baffle, each second vane comprising a surface inclined to the second surface of the baffle plate and where second vanes direct the received gas across second surface of the baffle".

Examiner responds that one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). In this case Redeker et al in view of Murugesh et al teach two gas sources 200, 65 and a baffle 248 with ridges (first vanes) 245 only for the cleaning gas coming out through gas outlets 247 (Figures 1, 2A, 2B, 3 – Murugesh et al). Halsey et al teach a baffle (body) 202 with vanes 210, 212 that have surface inclined to the surface (second) of the body (baffle) 202 [Figures 2, 3A-C, 4B]. It would be obvious to provide vanes (second vanes) with inclined surface, on the second surface of baffle in the apparatus of Redeker et al in view of Murugesh et al to obtain desired uniformity of flow for the process gases coming out of gas outlet 85. Reference by Frijlink is used for rejection of additional limitations recited in claim 11 as explained below. Since the combination of Redeker et al, Murugesh et al, Halsey et al and Frijlink teaches all limitations of claim 11, reference by Tzu et al is dropped and the rejection under 35 USC 103 (a) is maintained.

Thus rejection of claims 11-14 under 35 USC 103 (a) is maintained.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-6, 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murugesh et al (US Patent No. 6,450,117) in view of Halsey et al (US Patent No. 6,663,025).

Regarding Claim 1: Murugesh et al teach an apparatus (Figure 1A, 2A, 2B, 3) that includes a gas distributor 215 capable of distributing a gas across surfaces in a substrate processing chamber, the gas distributor comprising:

- (a) a tubular post (hub) 259 comprising a gas inlet and a gas outlet,
- (b) a baffle 248 extending radially outward from the tubular post (hub) 259, the baffle having opposing first surface 251 and a second surface,

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(c) first ridges (vanes) 245 and gas outlets 247 on the first surface of the baffle and where the first vanes direct the received gas across process chamber 30 surface (Column 6, line 20 to Column 7, line 30).

Murugesh et al do not teach second vanes on the second surface of the baffle and where the second vanes direct the received gas across the second surface of the baffle.

Halsey et al teach an apparatus (Figures 2, 3A-C, 4B) that includes a gas diffuser 200 that has a gas inlet nozzle 302, body and guide vanes 210, 212 on the opposite (second) surface of body (baffle) 202 to achieve flow uniformity.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the baffle plate of Murugesh et al by adding vanes (second vanes) on the second surface of baffle plate as taught by Halsey et al to achieve uniformity of gas flow (for the process gas coming through the outlet 85 – Figure 3, Murugesh et al) over the second surface of baffle plate (Column 3, lines 1-10).

Regarding Claims 2, 3: Murugesh et al teach (Figures 2A, 2B) the baffle 248 further comprises an outer perimeter, and wherein each ridge (first vane) 245 comprises an arcuate plate that curves outward from the hub to the outer perimeter of the baffle.

Murugesh et al also teach that ridges (vanes) 245 are shaped and sized so that so as to enable fresh flow of gases over selected chamber surfaces (Column 7, lines 12-30).

Regarding Claim 4: Murugesh et al teach (Figure 1A) that gas distributor (including tubular post 259) 215 comprises first and second channels, and the gas outlet

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comprises the terminus of the first channels (247a) and the terminus of the second channels (247b) {Column 6, lines 20-50}.

Regarding Claims 5, 6: Halsey et al teach (Figures 3A-3C, 4B) that guide vanes (second vanes) 210, 212 comprise a plurality of surfaces that are inclined to the second surface of the body (baffle) 202, at least a portion of the inclined surfaces being below the terminus (exit point for gases flowing out of nozzle 302) of the second channels {Column 5, lines 45-55 and Column 7, lines 20-40}. Halsey et al also teach that number of guide vanes may be selected as per process requirements (Column 5, lines 30-35).

Regarding Claim 8: Halsey et al teach that body 202 (baffle surface) can have any shape suitable for expanding gas flow (implies that shape or angle of guide vanes relative to body could be optimized) {Column 5, lines 15-35}.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Murugesh et al (US Patent No. 6,450,117) in view of Halsey et al (US Patent No. 6,663,025) as applied to claim 1 and further in view of Wheat et al (US PG PUB No. 2003/0116278).

Regarding Claim 7: Murugesh et al in view of Halsey et al teach all limitations of the claim including second vanes on second surface of baffle plate.

Murugesh et al in view of Halsey et al do not teach that second vanes comprise plurality of wedges.

Wheat et al teach an apparatus (Figure 1) that includes a gas distributor 10 with an inlet tube 14, an outlet manifold 18 with gas outlet holes 30 and wedge-shaped baffle

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deflectors (vanes) 34 proximate each hole. Wheat et al also teach that the deflectors 34 can have other configurations also (Paragraph 0032).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use wedge shaped deflectors (vanes) as taught by Wheat et al in the apparatus of Murugesh et al in view of and Halsey et al to provide the required flow path to the gases exiting from the gas outlet holes (Paragraph 0012).

Claims 9, 15-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murugesh et al (US Patent No. 6,450,117) in view of Halsey et al (US Patent No. 6,663,025) as applied to claim 1 and further in view of Frijlink (US PG PUB No. 2004/0200412).

Regarding Claim 9: Murugesh et al in view of Halsey et al teach all limitations of the claim except that hub has a gas feed-through tube capable of allowing a process gas to by-pass the first and second vanes and enter the chamber.

Frijlink teaches an apparatus (Figure 1) that includes a gas introduction arrangement that comprises concentric funnels (like gas feed through tube) that include inlet 1A for first precursor gas and inlet 1B for second precursor and enables the first gas to by-pass the vanes and enters the chamber (Paragraph 0024).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use hub with gas feed-through tube as taught by Frijlink in the apparatus of Murugesh et al in view of Halsey et al to enable supply plurality of gases through gas distributor.

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Regarding Claims 15, 17: Murugesh et al in view of Halsey et al teach all limitations of the claim as explained above except gas feed-through tube capable of allowing a process gas to by-pass the first and second vanes and enter the chamber.

Frijlink teaches an apparatus (Figure 1) that includes a gas outlet member (hub) 7 that includes concentric funnels (gas feed through tube) that includes inlet 1A for first precursor gas and inlet 1B for second precursor gas (Paragraph 0024).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use hub with gas fed through tube as taught by Frijlink in the apparatus of Murugesh et al in view of Halsey et al to enable supply plurality of gases through gas distributor.

Regarding Claim 16: Murugesh et al teach (Figure 1c) that remote plasma chamber 130 comprises gas supply (inlet) 125, gas energizer (activator) 175, gas conduit (outlet) 170 [Column 4, line 40 to Column 5, line 40].

Regarding Claim 18: Halsey et al teach (Figure 4B) that the pairs of inclined surfaces (of guide vanes 210, 212) are oriented to direct the gas across expansion surface (of gas distributor) 464. Halsey et al also teach that number of guide vanes may be selected as per process requirements (Column 5, lines 30-35).

Regarding Claim 19: Frijlink teaches an apparatus (Figure 1) that includes a gas outlet member (hub) 7 that includes concentric funnels (like gas feed through tube) that is capable of distributing energized gas into process chamber (Paragraph 0024).

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Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Murugesh et al (US Patent No. 6,450,117) in view of Halsey et al (US Patent No. 6,663,025) as applied to claim 1 and further in view of Horie et al (US Patent No. 6,132,512).

Regarding Claim 10: Murugesh et al in view of Halsey et al teach all limitations of the claim as explained above including a combination process and cleaning gas distributor comprising of cleaning gas distributor 200 and process gas distributor 65 having gas inlet and gas outlets 247 (Murugesh et al – Figure 3, column 7, line 65 to column 8, line 10).

Murugesh et al in view of Halsey et al do not teach process gas distributor with showerhead faceplate.

Horie et al teach an apparatus (Figures 13-15) that includes a gas ejection head having a gas supply head unit 50 with a double walled structure of an outer tube 51 connected to gas supply port 46 and inner tube 52 (like for process gas supply) connected to showerhead plate 42 with holes 42-1 (Column 12, lines 15-68).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use process gas distributor with showerhead faceplate as taught by Horie et al in the apparatus of Murugesh et al in view of Halsey et al to distribute gas uniformly over the surface of the wafer.

Claims 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Redeker et al (US Patent No. 6,182,602) in view of Murugesh et al (US Patent No. 6,450,117), Halsey et al (US Patent No. 6,663,025) and Frijlink (US PG PUB No. 2004/0200412).

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Regarding Claim 11: Redeker et al teach an apparatus (Figures 1, 13, 16) that includes a center gas feed (gas distributor) 312 to distribute a gas from an external source across surfaces in a substrate processing chamber 12 having a wall with a cavity, the gas distributor comprising:

(a) a base (hub) 334 that fits into the cavity in the wall of the chamber, the hub comprising (i) a plurality of first channels 342 in the base (hub) 334 that mates with the cavity, the first channels comprising openings and a terminus, the openings capable of receiving the gas from the external source (ii) a second channel 304 capable of receiving the gas from the terminus of the first channels, and

Redeker et al do not teach:

first channel along external surface of hub;

a baffle plate extending radially outward from the hub, the baffle plate comprising a first and second surface, an outer perimeter, and an aperture capable of allowing passage of the gas along the second channels;

first vanes on the first surface of the baffle plate, each first vane comprising an arcuate plate that curves outward from the hub,

second vanes on the second surface of the baffle plate, each second vane comprising a surface inclined to the second surface of the baffle plate;

whereby the first vanes direct the gas across the surfaces of the chamber,

the second vanes direct the gas across the second surface of the baffle plate, and the

(iii) a gas feed-through tube that allows the gas to bypass the first and second set of vanes.

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Murugesh et al teach an apparatus (Figure 1A, 2A, 2B) that includes a gas distributor 215 capable of distributing a gas across surfaces in a substrate processing chamber, the gas distributor comprising:

- (a) a tubular post (hub) 259 comprising a gas inlet and a gas outlet and gas channel along external surface of tubular post (hub) 259,
- (b) a baffle 248 extending radially outward from the tubular post (hub) 259, the baffle having opposing first surface 251 and a second surface,
- (c) first ridges (vanes) 245 on the first surface of the baffle each vane comprising arcuate plate that curves outward from the hub; and

whereby the first vanes direct the received gas across process chamber 30 surface (Column 6, line 20 to Column 7, line 30).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use hub and baffle plate configuration as taught by Murugesh et al in the apparatus of Redeker et al to enable uniformly remove residues having variable thickness or non-uniform chemical compositions without eroding underlying chamber surfaces (Column 1, lines 55-60).

Redeker et al in view of Murugesh et al do not teach second vanes on the second surface of the baffle and where the second vanes direct the received gas across the second surface of the baffle.

Halsey et al teach an apparatus (Figures 2, 3A-C, 4B) that includes a gas diffuser 200 that has a gas inlet nozzle 302, body (baffle plate) 202 and guide vanes (second vanes) 210, 212 on the opposite (second) surface of body where each second vane comprising

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a surface inclined to the second surface of body (baffle plate) 202 and the second vanes direct the gas across the second surface of the baffle plate.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the baffle plate of Redeker et al in view of Murugesh et al by adding vanes (second vanes) on the second surface of baffle plate as taught by Halsey et al to achieve uniformity of gas flow (for the process gas coming through the outlet 85 – Figure 3, Murugesh et al) over the second surface of baffle plate (Column 3, lines 1-10). Redeker et al in view of Murugesh et al and Halsey et al do not teach gas feed-through tube capable of allowing a process gas to by-pass the first and second vanes and enter the chamber.

Frijlink teaches an apparatus (Figure 1) that includes a gas outlet member (hub) 7 that includes concentric funnels (gas feed through tube) that includes inlet 1A for first precursor gas and inlet 1B for second precursor (Paragraph 0024).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use hub with gas fed through tube as taught by Frijlink in the apparatus of Redeker et al in view of Murugesh et al and Halsey et al to enable supply plurality of gases through gas distributor.

Regarding Claim 12: Murugesh et al teach (Figures 2A, 2B) the baffle 251 further comprises an outer perimeter, and wherein each ridge (first vane) 245 comprises an arcuate plate that curves outward from the hub to the outer perimeter of the baffle.

Murugesh et al also teach that ridges (vanes) 245 are shaped and sized so that so as to enable fresh flow of gases over selected chamber surfaces (Column 7, lines 12-30).

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Regarding Claims 13, 14: Halsey et al teach (Figure 4B) that guide vanes (second vanes) 210, 212 comprise a plurality of surfaces that are inclined to the second surface of the body (baffle) 202, at least a portion of the inclined surfaces being below the terminus (exit point for gases flowing out of nozzle 302) of the second channels {Figure 3A-3C, Column 5, lines 45-55 and Column 7, lines 20-40}. Halsey et al also teach the pairs of inclined surfaces (of guide vanes 210, 212) are oriented to direct the gas across expansion surface (sector of the second surface of the baffle plate) 464. Halsey et al also teach that number of guide vanes may be selected as per process requirements (Column 5, lines 30-35).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rakesh K. Dhingra whose telephone number is (571)-272-5959. The examiner can normally be reached on 8:30 -6:00 (Monday - Friday). If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571)-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Rakesh Dhingra



Parviz Hassanzadeh
Supervisory Patent Examiner
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